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Stable High Temperature Liquid Lubricant Blends & Antioxidant Additives for Use Therewith

Liquid lubricant for high temperature (200 °C) engine applications

Description

This liquid composition is a base stock blend for high temperature lubricants and a solid antioxidant additive solubilized for high temperature lubricants. Its liquid composition includes a polyolester, a phosphate ester and a synthetic hydrocarbon and the solid antioxidant comprises a high molecular weight polyphenol ester.

Recent advances in the field of engines and propulsion systems require lubricants that can withstand temperatures exceeding 200 °C for a long period of time and temperatures exceeding 375 °C - 400 °C for a short duration (e.g. 10-15 minutes). For example, adiabatic or low heat rejection diesel engines have much higher combustion temperatures than conventional engines, resulting in maximum top ring temperatures of 375 °C - 400 °C in the piston, ring and liner elements of the engine.

Typical lubricants subjected to such a high temperature environment suffer from severe and rapid thermal and oxidative deterioration. Oxidation of a lubricant produces reaction products which eventually form deposits that are detrimental to oil consumption and engine emissions.

Antioxidants typically are added to lubricants to combat oxidation. Conventional mixtures of antioxidants and lubricant base stocks, however, are thermally unstable at the higher temperatures generated in the newer engine and propulsion system designs. They tend to decompose and/or evaporate at high temperatures and do not protect the lubricant. Moreover, if the molecular weight of the antioxidant is increased or its molecular structure changed to improve its thermal stability, the solubility of the antioxidant in conventional mineral oil/polyalphaolefin oil lubricants decreases drastically, often to the extent of becoming insoluble.

Applications

- **Automobiles and vehicles**
  Useful in a wide variety of auto engines, either gasoline or diesel powered.

Advantages

- **High temperature lubricant**
  Withstands sustained temperatures of 200°C without evaporating or deteriorating; additionally it can also tolerate up to 15 minutes of exposure to temperatures near 400°C.
- **Clean and efficient**
  The lubricant does not break down, so the engine runs cleaner and more efficiently for longer periods of time.

Abstract

An antioxidant additive for an engine or propulsion system lubricant subjected to high temperatures which includes a high molecular weight substituted phenolic carboxylic acid tetraester of pentaerythritol. A lubricant blend which is capable of solubilizing the antioxidant additive and includes a polyolester, a phosphate ester and at least one of a polyalphaolefin and an alkylated naphthalene.

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Citations

1. 1.) Perez, Joseph M. "Additives for Industrial Lubricant Applications," Lubricant Additives: Chemistry and Applications; ed. Rudnick, Leslie R. (2003)

References

- Expired U.S. Patent # 5,236,610 issued 08-17-1993, expired 02/03/2012
- Docket: 89-040US

Status of Availability

This technology is available in the public domain.

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